

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (currently amended): A method of materials processing, wherein the method comprises applying bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width and the second pulse has a second pulse width, and the first pulse width is greater than the second pulse width, the second pulse width being about 1 picosecond in the picosecond range or shorter, the first pulse further comprising a pedestal having sufficient energy to at least thermally heat the target area of the material.

**2-5: cancelled**

6. (original): The method as claimed in claim 1, wherein the first pulse has a first polarization vector and the second pulse has a second polarization vector, wherein the first polarization vector is not equal to the second polarization vector.

7. (original): The method as claimed in claim 1, wherein the first pulse has a first wavelength and the second pulse has a second wavelength, wherein the first wavelength is not equal to the second wavelength.

8. (original): The method as claimed in claim 1, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

**9-10: cancelled**

11. (currently amended): The method as claimed in claim 1, wherein the first pulse further comprises amplified spontaneous emission having sufficient energy to thermally heat the target area of the material.

12. (currently amended): A method of materials processing, wherein the method comprises applying bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width and the second pulse has a second pulse width, and the first pulse width is greater than the second pulse width and greater than 10ps in duration, the second pulse width being about 1 picosecond in the picosecond range or shorter, wherein the first pulse at least thermally heats the target area of the material .

**13-15: cancelled**

16. (original): The method as claimed in claim 12, wherein the first pulse has a first polarization vector and the second pulse has a second polarization vector, wherein the first polarization vector is not equal to the second polarization vector.

17. (original): The method as claimed in claim 12, wherein the first pulse has a first wavelength and the second pulse has a second wavelength, wherein the first wavelength is not equal to the second wavelength.

18. (original): The method as claimed in claim 12, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

**19-20: cancelled**

21. (previously presented): The method as claimed in claim 12, wherein the first pulse comprises amplified spontaneous emission having sufficient energy to thermally heat the target area of the material.

22. (previously presented): A method of materials processing, wherein the method comprises applying bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width and the second pulse has a second pulse width, wherein predetermined parameters of the first pulse are selected to induce a change in a selected property of the material, and predetermined parameters of the second pulse are selected based upon the property change induced by the first pulse ,and where the first pulse is substantially linearly absorbed and the second pulse is nonlinearly absorbed.

23. (original): The method as claimed in claim 22, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

24. (original): The method as claimed in claim 22, wherein the predetermined parameters of the first pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector and the predetermined parameters of the second pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector.

**25-26: cancelled**

27. (original): The method as claimed in claim 24, wherein the pulse wavelength of the first pulse is not equal to the pulse wavelength of the second pulse.

28. (original): The method as claimed in claim 24, wherein the pulse polarization of the first pulse is not equal to the pulse polarization of the second pulse.

29. (original): The method as claimed in claim 22, wherein the first pulse changes electronic properties of the processed material.

30. (original): The method as claimed in claim 22, wherein the first pulse changes structural properties of the processed material.

31. (currently amended): The method as claimed in claim 22, wherein the first pulse creates a heat affected zone in the processed material and the second pulse ablates at least a portion of the heat affected zone.

**32-33: cancelled**

34. (currently amended): The method as claimed in claim 22, wherein the first pulse further comprises a pedestal or amplified spontaneous emission having sufficient energy to at least thermally heat the target area of the material.

35. (currently amended): A method of materials processing, wherein the method comprises applying bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width greater than 10ps and the second pulse has a second pulse width about 1 picosecond or shorter, wherein predetermined parameters of the first pulse are selected to induce a change in a selected property of the material, and predetermined parameters of the second pulse are selected based upon the property change induced by the first pulse ,the first pulse creating a heat affected zone in the processed material and the second pulse ablating at least a portion of the heat affected zone.

**36. (cancelled)**

37. (original): The method as claimed in claim 35, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

38. (original): The method as claimed in claim 35, wherein the predetermined parameters of the first pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector and the predetermined parameters of the second pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector.

**39-40: cancelled**

41. (original): The method as claimed in claim 38, wherein the pulse wavelength of the first pulse is not equal to the pulse wavelength of the second pulse.

42. (original): The method as claimed in claim 38, wherein the pulse polarization of the first pulse is not equal to the pulse polarization of the second pulse.

43. (original): The method as claimed in claim 35, wherein the first pulse changes electronic properties of the processed material.

44. (original): The method as claimed in claim 35, wherein the first pulse changes structural properties of the processed material.

**45-46: cancelled**

47. (previously presented): The method as claimed in claim 35, wherein the first pulse further comprises a pedestal or amplified spontaneous emission having sufficient energy to thermally heat the target area of the material.

48. (currently amended): A laser apparatus for materials processing, wherein the laser applies bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least wherein the first pulse emitted by the laser apparatus has a first pulse width and the second pulse emitted by the laser apparatus has a second pulse width, first and second pulses of laser light displaced or overlapped in time, and the first pulse width is greater than 10 ps and longer than the second pulse width, the second pulse width being about 1 picosecond in the picosecond range or shorter, and only the second pulse having an energy density above an ablation threshold of the material, wherein the first pulse emitted from the laser apparatus comprises sufficient amplified spontaneous emission to at least thermally heat the target area of the material.

**49-50 cancelled**

51. (original): The laser apparatus as claimed in claim 48, wherein the first pulse emitted by the laser apparatus has a first polarization vector and the second pulse emitted by the laser apparatus has a second polarization vector, wherein the first polarization vector is not equal to the second polarization vector.

52. (original): The laser apparatus as claimed in claim 48, wherein the first pulse emitted by the laser apparatus has a first wavelength and the second pulse emitted by the laser apparatus has a second wavelength, wherein the first wavelength is not equal to the second wavelength.

53. (original): The laser apparatus as claimed in claim 48, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

**54-56: cancelled**

57. (currently amended): A laser apparatus of materials processing, wherein the laser apparatus applies bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse emitted by the laser apparatus has a first pulse width and the second pulse emitted by the laser apparatus has a second pulse width, and the first pulse width is greater than one nanosecond , the second pulse width being about 1 picosecond in the picosecond range or shorter ,wherein the first pulse emitted from the laser apparatus comprises sufficient amplified spontaneous emission to at least thermally heat the target area of the material.

**58-59: cancelled**

60. (original): The laser apparatus as claimed in claim 57, wherein the first pulse emitted by the laser apparatus has a first polarization vector and the second pulse emitted by the laser apparatus has a second polarization vector, wherein the first polarization vector is not equal to the second polarization vector.

61. (original): The laser apparatus as claimed in claim 57, wherein the first pulse emitted by the laser apparatus has a first wavelength and the second pulse emitted by the laser apparatus has a second wavelength, wherein the first wavelength is not equal to the second wavelength.

62. (original): The laser apparatus as claimed in claim 57, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

**63-65: cancelled**

66. (currently amended): A laser apparatus for materials processing, wherein the laser apparatus applies bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse emitted by the laser apparatus has a first pulse width greater than 10 $\text{ps}$  picoseconds and the second pulse emitted by the laser apparatus has a second pulse width less than about 1 picosecond, and wherein predetermined parameters of the first pulse induce a change in a selected property of the material, and predetermined parameters of the second pulse interact with the property change induced by the first pulse, and the first pulse is a pedestal portion of the second pulse, and wherein the first pulse emitted from the laser apparatus comprises sufficient amplified spontaneous emission to at least thermally heat the target area of the material.

67. (original): The laser apparatus as claimed in claim 66, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

68. (original): The laser apparatus as claimed in claim 66, wherein the predetermined parameters of the first pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector and the predetermined parameters of the second pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector.

69. (original): The laser apparatus as claimed in claim 66, wherein the first pulse changes electronic properties of the processed material.

70. (original): The laser apparatus as claimed in claim 66, wherein the first pulse changes structural properties of the processed material.

71. (currently amended): The laser apparatus as claimed in claim 66, wherein the first pulse creates a heat affected zone in the processed material and the second pulse ablates at least a portion of the heat affected zone.

**72-74: cancelled**

75. (previously presented): A laser apparatus for materials processing, wherein the laser apparatus applies bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, and wherein the first pulse emitted by the laser apparatus has a first pulse width and the second pulse emitted by the laser apparatus has a second pulse width, wherein predetermined parameters of the first pulse induce a change in a selected property of the material, and predetermined parameters of the second pulse interact with the property change induced by the first pulse, and only the second pulse is nonlinearly absorbed by the material.

shorter, and wherein the first pulse emitted from the laser apparatus comprises sufficient amplified spontaneous emission to at least thermally heat the target area of the material.

76. (original): The laser apparatus as claimed in claim 75, wherein the predetermined repetition rate is substantially equal to or greater than 100 kilohertz.

77. (original): The laser apparatus as claimed in claim 75, wherein the predetermined parameters of the first pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector and the predetermined parameters of the second pulse comprise pulse width, pulse energy, pulse wavelength and pulse polarization vector.

78. (original): The laser apparatus as claimed in claim 75, wherein the first pulse changes electronic properties of the processed material.

79. (original): The laser apparatus as claimed in claim 75, wherein the first pulse changes structural properties of the processed material.

80. (currently amended): The laser apparatus as claimed in claim 75, wherein the first pulse creates a heat affected zone in the processed material and the second pulse ablates at least a portion of the heat affected zone.

**81-84: cancelled**

85. (new): A method of materials processing, wherein the method comprises applying bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width and the second pulse has a second pulse width, and the first pulse width is greater than the second pulse width and greater than 10ps in duration, the second pulse width being an ultrashort pulse, wherein the first pulse

further comprises amplified spontaneous emission (ASE) having sufficient energy to at least thermally heat the target area of the material.

86. (new): The method of claim 85 wherein the first pulse provides a thermal machining mechanism.

87. (new): The method of claim 85, wherein a wavelength of the amplified spontaneous emission is different than a wavelength of the second pulse.

88. (new): The method of claim 87, further comprising: compressing a pulse width so as to produce the ultrashort pulse, and controlling a ratio of the energy in the first and second pulses, wherein compressing and controlling are carried out with a pulse compressor and a wavelength sensitive element disposed in the compressor.

89. (new): The method of claim 1, wherein the first pulse provides a thermal machining mechanism.

90. (new): The method of claim 12, wherein the first pulse provides a thermal machining mechanism.

91. (new): A laser apparatus of materials processing, wherein the laser system applies bursts of laser light to a target area of a material at a predetermined repetition rate, the burst of laser light comprising at least first and second pulses of laser light displaced or overlapped in time, wherein the first pulse has a first pulse width and the second pulse has a second pulse width, and the first pulse width is greater than the second pulse width and greater than 10ps in duration, the second pulse width being an ultrashort pulse, wherein the first pulse emitted from the laser apparatus further comprises amplified spontaneous emission (ASE) having sufficient energy to at least thermally heat the target area of the material.

92. (new): The system of claim 91, wherein a wavelength of the amplified spontaneous emission is different than a wavelength of the ultrashort pulse.

93. (new): The method of claim 92, wherein said apparatus further comprises a compressor to compress a pulse width so as to produce the ultrashort pulse, and a wavelength sensitive element disposed within the compressor to control a ratio of energy of the first and second pulses.